February 10, 1852.

W. Yarrell, Esq., in the Chair.

The following papers were read :—

1. Monograph of the Family Branchipodidæ, a family of Crustaceans belonging to the Division Entomostraca, with a description of a new genus and species of the family, and two new species belonging to the Family Limnadiadæ. By W. Baird, M.D., F.L.S. &c.

(Annulosa, Pl. XXII. XXIII.)

Next to the *Apodidæ*, the largest species of *Entomostraca* belong to the family *Branchipodidæ*. This family contains perhaps the most beautiful animals of the division, elegant in form and graceful in movement. The species are, geographically, widely extended, but those as yet described are few in number.

The Family may be thus characterized.

Order Phyllopoda.

Family Branchipodidæ.

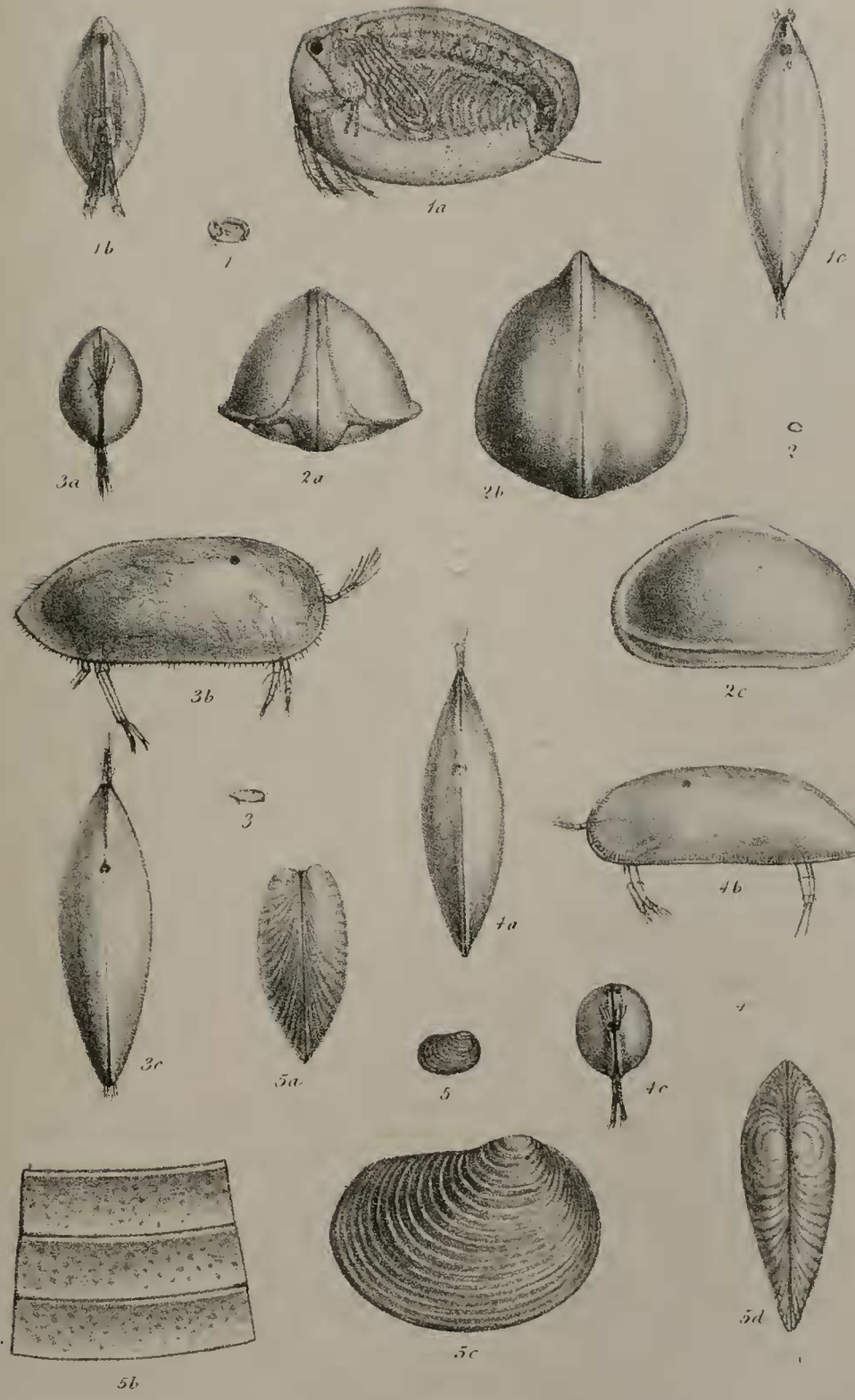
Pedes branchiales, paribus undecim ad novemdecim. Antennæ dissimiles, paribus duobus; par inferior in mare prehensilis. Oculi duo, pedunculati. Corpus cylindricum, nudum, clypeo nullo obtectum.

The feet are all branchial, being formed entirely for breathing with, and consist of 11 pairs, each pair gradually enlarging in size as they descend. They are in constant motion, and when so, present a very beautiful wavy appearance. Like the *Apodidæ* the animals of this family swim upon their backs. The body consists of a considerable number of segments, and is quite naked, having neither a shield-shaped carapace like the *Apodidæ*, nor a bivalve-shell-shaped carapace like the other families of the Order *Phyllopoda*. The antennæ are dissimilar in appearance in the male and female. The superior pair in both sexes are slender and filiform, but the inferior pair are much larger in the male than in the female, and serve the purpose of prehensile organs. The eyes are two in number, compound, oval-shaped, and are placed upon considerable-sized peduncles. Like the *Apodidæ*, the young *Branchipodidæ* have only one eye, which disappears in the process of moulting, but leaves a mark behind which remains visible in the adult.

The species included in this family are referable to five genera.

Genus Branchipus, Schæffer.

Corpus molle, cylindricum, segmentum caudale pinnis duabus ciliatis instructum. Pedes undecim. Antennæ inferiores maris magnæ, bi-articulatæ, cornibus similes, appendicibus duabus filiformibus, antenniformibus, armatæ.



1 Limnadia antillarum 2 Cypris cuneata (♂) 3 Cypris Schomburgkii
4 Cypris Belcheri 5 Estheria Dallasii.

The body is soft, cylindrical in shape, and is composed of twenty-two segments. The head consists of two and the thorax of eleven, each of which gives attachment to a pair of branchial feet. The abdomen consists of nine, the caudal segment dividing into two broad flat appendages of some length, and plumose on their edges. The inferior antennæ, or "cephalic horns," in the male are large organs; they are composed of two articulations, which being cylindrical and curved at the apex give an appearance of a pair of horns, and they have springing from near their base a filiform appendage closely resembling in appearance the superior antennæ. The structure of these inferior antennæ, or cephalic horns as they are generally termed, and the filiform appendage at their base, which are frequently described as an additional pair of antennæ, sufficiently distinguish the genus.

Only two species of *Branchipus* have as yet been described.

1. Branchipus pisciformis, Schæffer. *Antennis inferioribus maris magnis, compressis, apice bifurcatis; appendicibus antenniformibus filiformibus prælongis; fronte prolongato, bisulco.*

Long. $\frac{1}{2}$ poll.

Syn. *Apus pisciformis,* Schæffer, Der Fisch-form. Kiefenfuss, etc. t. 5. f. 1–11 (1752).

Cancer stagnalis, Linnæus, Syst. Nat. edit. 10. 634 (1758); Faun. Suec. ed. 2. 497. No. 2043 (1761); Fabricius, Ent. Syst. ii. 518. No. 11; Mantiss. i. 335. No. 10; Müller, Zool. Dan. Prodrom. 2351; O. Fabricius, Faun. Grœnland. 247. No. 224.

Branchipus pisciformis, Schæffer, Element. Entomol. t. 29. f. 6, 7 (1766).

Gammarus stagnalis, Fabricius, Syst. Entom. 419. No. 5.

Cancer (*Gammarellus*) *stagnalis,* Herbst, Krabben und Krebse, ii. 121. No. 66. t. 35. f. 8–10 (1796).

Branchiopoda stagnalis, Lamarck, Syst. An. s. Vert. 161; Latreille, Hist. Nat. Crust. iv. 319. t. 36, 37; Gen. Crust. i. 22; Bosc, Man. d'Hist. Nat. Crust. ii. 234.

Branchipus stagnalis, Latreille, Enc. Méth. t. 336. f. 14–16; Règne Anim. iv. 174; Leach, Dict. Sc. Nat. xiv. 542; Edin. Encyc. vii. 384; Desmarest, Cons. gen. Crust. 389; Lamarck, Hist. An. s. Vert. v. 133; M. Edwards, Hist. Nat. Crust. iii. 367; Règn. An. ed. Crochart, t. 74. f. 2.

Branchipus Schæfferi, Fischer de Waldheim, Bull. Soc. Imp. Moscou, vii. (1834); Thompson, Zool. Research. fasc. v. t. 3. f. 1–3 (1834).

Branchipus melanurus? Koch, Deutsch. Crust. H. 35. t. 2.

Ino stagnalis? Oken, Lehrb. der Naturg. iii. 399.

Larva aquatica, Linn. Faun. Suec. ed. 1. 358. No. 1357.

Hab. In vicinitate urbis Ratisbonæ; *Schæffer.* In vicinitate urbis Paris; *M. Edwards.*

This species according to Schæffer's description is half an inch long, about the thickness of a straw, and semipellucid. The male is generally of a pale red or flesh colour, though sometimes varying between vermilion and orange. The female is of a dull green, with the

ovaries generally of a bright blue. The inferior antennæ of the male are large organs, somewhat flattened in shape, broad at the base, toothed at about two-thirds of their length on the external edge, and becoming narrower near the extremity, which presents an appearance as if somewhat bifurcated. Those of the female are much shorter, cylindrical, and pointed at the extremity. The two antenniform appendages arising from near the base of these organs in the male are of considerable length, longer than the antennæ themselves, and filiform. The front of the head is prolonged into a prominence which is cleft down the centre and forked. The feet are long, composed of three joints, all of which are nearly of equal size, and have their edges beset with numerous short hairs or setæ, which when magnified are finely plumose. The caudal fins are of considerable size, flat and plumose. The male organs are slender and rather long.

2. Branchipus spinosus, M. Edwards. *Antennis inferioribus maris magnis, cylindricis, apice acuminatis; appendicibus antenniformibus curtis, crassis; abdominis segmentis infra spiniferis.*

Long. 1 poll. 2 lin.

Branchipus spinosus, M. Edwards, Hist. Nat. Crust. iii. 367.

Hab. In lacu salino "Hadjibé," in vicinitate urbis Odessæ; *M. Nordmann.*

This species, which was discovered by Professor Nordmann in a salt lake near Odessa, is upwards of an inch in length. The inferior antennæ of the male are large, cylindrical, the terminal articulation being sharp at the point. They possess no tooth or process, and the antenniform appendages are very short compared with those of the preceding species, and of a considerable degree of thickness. The front of the head has no prolongation. The feet are short. The segments of the abdomen are armed underneath with sharp spines, and the caudal fins are short and plumose. The male organs are short and obtuse.

Genus Streptocephalus.

Corpus cylindricum, segmentum caudale pinnis duabus ciliatis instructum; pedes undecim; antennæ inferiores maris triarticulatæ, valde tortuosæ, ad apicem in ramos graciles divisæ, appendicibus antenniformibus armatæ.

In the structure of the body, abdomen, and feet, this genus resembles entirely the preceding. The inferior antennæ, or cephalic horns, in the male, however, are very different in structure; they are longer in proportion than the corresponding organs in the *Branchipus*, consist of three articulations, and are singularly twisted, and bent as it were into elbows. The terminal joint divides at the apex into two branches. They are inhabitants of fresh water. Only two species have as yet been described, and I now add a third to the number.

1. Streptocephalus torvicornis, Waga. *Antennis inferioribus maris validis, ramis terminalibus elongatis, serratis, interno*

longiore, processu triangulari brevi armato, appendicibus antenniformibus elongatis filiformibus ; fronte prolongato, acuminato ; ovario externo conico.

Long. maris 1 poll., fœminæ circa 14 lin.

Branchipus torvicornis, Waga, Ann. Soc. Ent. de France, xi. 261. t. 11. f. 1–4.

Hab. In vicinitate urbis "Warsaw;" *Krynicki.*

This species, which was discovered by M. Krynicki in a muddy stagnant piece of water near the town of Warsaw, is upwards of an inch in length, the female being longer than the male. The inferior antennæ or cephalic horns of the male are very large, when extended equalling in length the whole body. The basal joint is strong, and broad at its junction with the head; the second is short, and the third is divided at the apex into two branches, which are long, slender and serrated on their inner edges, the internal one being the longer, bent into the form of a hook, and having on its external edge a process of a triangular form and acuminated at the point. The first and second joints are armed with several minute teeth, and the antenniform appendages are straight, slender, but somewhat stouter than the superior antennæ. The front of the head is prolonged into a prominence which is pointed. The inferior antennæ in the female are flat, and obtusely rounded at the extremity. The ovarian bag is conical in shape and of a blue colour. The caudal fins are of considerable size and plumose on their edges.

2. Streptocephalus cafer, Lovén. *Antennis inferioribus maris longis, articulo basali intus appendice lacinulata brevi prædito, ramo terminali interno longo, flexuoso, inermi ; fronte prolongato, in rostrum lunatum producto ; ovario externo caligæformi.*

Long. 15 millim.

Branchipus cafer, Lovén, Kongl. Wet. Akad. Handl. 1845, 433. t. 5. f. 1–20.

Hab. In paludibus terræ Cafrorum Natalensium; *Wahlberg.*

This species was discovered by M. Wahlberg in some pools of fresh water in Port Natal, and is about 15 millimetres in length. The inferior antennæ or cephalic horns in the male are long stout organs and flexuose in shape. The basal joint is rather short, rounded, and is furnished at its base on the internal edge with a short appendage of a lanceolate form and toothed on its edge externally. The third joint divides at the apex into two branches, the internal one being long, slender and flexuose, the external being club-shaped and forked at the extremity, dividing into two other slender branches of unequal length. The antenniform appendages are filiform and flexuose. The front of the head is prolonged into a narrow deflected beak, which is forked at its extremity. The male organs are long and slender; they are composed of four articulations, the last of which is much the longest, is curved, and armed on each side with a numerous row of teeth and spines.

In the female the cephalic horns are broad, thick, and furnished

with a sharp hooked point at the extremities. The caudal fins are of considerable size and finely plumose. The oviferous sac is long and narrow, and resembles very much in shape a long stocking or boot. The ova are of a rosy colour.

3. Streptocephalus similis, Baird (Tab. XXII. fig.3, 4). *Antennis inferioribus maris longis, cylindricis, appendice lunulata destitutis, ramis terminalibus præcedenti similibus, appendicibus antenniformibus filiformibus elongatis ; fronte prolongato, in rostrum bilobatum producto ; ovario externo conico.*

Long. maris 8 lin., fœm. 6 lin.

Hab. In insula "St. Domingo," in India Occidentali. Collegit M. Sallé. Mus. Brit.

This species, which was found by M. Sallé in the island of St. Domingo in the West Indies, is of a slender and cylindrical form. The male is about $\frac{5}{8}$ths of an inch in length, and the female half an inch. The inferior antennæ or cephalic horns in the male are large and tortuous ; they are composed of three joints ; the first or basal joint is the largest, is cylindrical, and extends for some distance straight forwards ; the second, smaller than the basal, is also cylindrical, curves slightly at first, then bends suddenly backwards upon itself ; the third or terminal joint bends as suddenly forwards and terminates in a club-shaped extremity, which divides into two branches, one longer than the other, terminating in a long filiform process ; the other flatter, shorter, and dividing into two shorter filiform processes of unequal length. The antenniform appendage is long and cylindrical, rather stout, and springs from close to the extremity of basal joint. The basal joint is destitute of the lanceolate, toothed appendage on internal edge, which we see in the preceding species. The superior antennæ are long and slender, and consist of two joints, the basal one much shorter than the second. The male organs are rather long, cylindrical, and of a horny texture. The front of the head is prolonged into a beak, which is flat, rather broad and slightly lobed at the extremity. Feet short. Abdomen slender. Caudal appendages of moderate length, and beset on each side with numerous short and plumose setæ.

The cephalic horns in the female are short, thick, and terminate in a short spine at the extremity. The ovarian bag is conical, acute, and the ova are of an ochreous colour.

The chief differences between this species and *S. cafer* consist, in the male, in the shape of the front of the head, the organs of generation, and in the inferior antennæ having no lamina with teeth on the basal joint ; in the female, in the shape of the external ovary.

Genus Chirocephalus, Prevost.

Corpus molle, cylindricum ; segmentum caudale pinnis duabus ciliatis instructum ; pedes undecim ; antennæ inferiores maris validæ, biarticulatæ, appendicibus digitiformibus flabelliformibusque armatæ.

This genus closely resembles the two preceding in the shape and

form of the body, having the same number of articulations, possessing the same number of feet, and having similar caudal fins. It is in the structure of the inferior antennæ or cephalic horns in the male, that the important difference between the two genera exists. These antennæ are very large, and are composed of two joints. At the base of the first joint a complicated apparatus arises, which when unfolded presents a very curious appearance. This consists of a long, flat, curved, very flexible body, somewhat tapering and toothed on its edges, and composed of numerous short articulations, which the animal can fold up upon itself like a ribbon. Springing from its external edge near the base are four rather long and flexible appendages strongly toothed on their internal edge, somewhat resembling long fingers, and in addition to these a large membranous triangular-shaped body, toothed on its edges all round, which when extended nearly covers the finger-like bodies, and can be folded and unfolded like a fan. When the animal is at rest these organs are folded up underneath the head in the same manner as a butterfly folds its proboscis, but when in pursuit of the female they become extended at full length and present a very beautiful appearance.

Five species of this genus have now been described.

1. Chirocephalus diaphanus, Prevost. *Antennis inferioribus maris validis, cylindricis, apice acuminatis, processu dentato ad basin articuli secundi armatis; fronte rotundato.*

Long. maris 14 lin., fœminæ 1 poll.

Pro Synonymis vide "Baird's Nat. Hist. of the British Entomostraca, Ray Society, 1850."

Hab. In Anglia, Gallia, prope Genevam, &c. &c.

This species, which occurs in many places in England, as well as in France, Switzerland, &c., is very elegant in form, and (the male more especially) very beautiful in colour. It is upwards of an inch in length, slender, of a cylindrical form, and nearly transparent. In the male the inferior antennæ or cephalic horns are of a beautiful translucent bluish green colour, tipped at the extremity with a fine red hue. The caudal fins are of a bright red. The female has a strip of blue along the whole length of the back, and the ovarian bag when full of ova is conical in shape and of a reddish brown. The inferior antennæ of the male are very strong organs, divided into two joints; the basal joint is thick and fleshy, and the terminal joint is cylindrical and curved in the form of a horn, having at the base where it joins the first joint a flat plate attached to it, beset with several stout teeth. The apparatus which we find at the base of the first joint, consisting of the long, flat, somewhat tapering body with its digitiform and fan-shaped appendages, is of a very delicate transparent bluish green colour. The antennæ of the female are short, stout, pointed at the extremity, flexible, and slightly curved downwards.

2. Chirocephalus lacunæ, Guérin. *Antennis inferioribus maris validis, valde arcuatis, articulo basali magno, dentato, terminali cylindrico, ad apicem sinuato.*

Long. maris et fœminæ 12–15 millim.

Branchipus lacunæ, Guérin, Iconog. Règn. Anim. Crustacés, 39. t. 33. f. 4, 4 *a*.

Hab. In stagnis prope "Fontainebleau;" *M. Guérin.*

This species, which is briefly described by M. Guérin in the 'Iconographie du Règne Animal,' is found in little pools of water near Fontainebleau. It is transparent, but is smaller than the preceding species, and is distinguished from it by the shape of the inferior antennæ or cephalic horns in the male. These organs are of two joints; the basal one large, and armed on its internal edge with several stout teeth or lobes; the second much smaller, cylindrical, bent suddenly back upon the first, and sinuated, or as it were slightly toothed at the apex. The long ribbon-like appendage which springs from the base of the first joint appears to have only two very short processes attached to it, instead of the four long finger-like bodies, and the fan-shaped body is not represented at all; but this part of the head is not sufficiently described by M. Guérin to enable me to satisfactorily ascertain its exact structure.

3. Chirocephalus claviger, Fischer. *Antennis inferioribus maris validis, articulo basali magno, terminali parvo, ad basin dentato, ad apicem clavato; antennis superioribus quadri-articulatis; fronte rotundato.*

Long. 8–10 lin.

Branchipus claviger, Seb. Fischer, Middendorff's Sibirische Reise, ii. Wirbellose, 149. t. 7. f. 1–11 (1851).

Hab. In fluvio Taimyr, in Siberia; *Middendorff.*

This species, which is about 8 or 10 lines long, was discovered by M. Middendorff in a pool of water by the river Taimyr in Siberia. The inferior antennæ of the male are strong organs; the basal joint being stout and fleshy and the terminal narrow, provided with about a dozen small teeth at its base, and ending in a club-shaped extremity. The digitiform appendages are more numerous apparently than in *C. diaphanus*. They arise from the extremity of the long riband-like appendage, instead of from its base, and each of them has several teeth on the sides and apex. In the female these antennæ are small, narrow and sharp-pointed. The superior antennæ are divided into four articulations.

4. Chirocephalus birostratus, Fischer. *Antennis inferioribus maris validis, articulo basali magno, terminali mediocri, prope basin processu elongato armato, ad apicem uncinato.*

Long. 10–12 lin.

Branchipus birostratus, Seb. Fischer, Middendorff's Sibirische Reise, ii. t. 7. f. 12–16 (1851).

Hab. Prope urbem "Charkow" in Russia; *Fischer.*

This species is about 10 or 12 lines long, and was found by Fischer in the neighbourhood of the town of Charkow, in Russia. The inferior antennæ of the male are strong organs, the basal joint stout and fleshy, the terminal of moderate size, having, springing

from near its base, a somewhat elongated process armed with sharp teeth at its extremity, and ending in a sort of hooked point. The riband-like process appears similar to that of *C. diaphanus*.

5. Chirocephalus Middendorffianus, Fischer. *Antennis inferioribus maris validis, articulo basali magno, longissimo, numerose dentato, terminali cylindrico, acuto; antennis superioribus quadri-articulatis; fronte quadrangulari.*

Long. 7–9 lin.

Branchipus Middendorffianus, Seb. Fischer, Middendorff's Sibirische Reise, ii. 153. t. 7. f.17–23 (1851).

Hab. In fluviis "Taimyr et Boganida" in Siberia; prope "Tri-Ostrowa" in Lapponia; *Middendorff*.

This species, which is only from 7 to 9 lines in length, was found by Middendorff in pools on the banks of the rivers Taimyr and Boganida in Siberia, and in Lapland near Tri-Ostrowa. The inferior antennæ in the male are stout organs, the basal joint being very long and fleshy and armed along the inner edge with a long row of many teeth, the terminal being cylindrical in shape and pointed at the extremity. The superior antennæ are four-jointed, and the front of the head is of a quadrangular shape. The ovarian sac in the female is long and rather slender, and appears to be notched at the base.

Genus Artemia, Leach.

Corpus molle, gracile; segmentum caudale pinnis nullis instructum; pedes undecim; antennæ inferiores maris magnæ, biarticulatæ, compressæ, appendicibus nullis armatæ.

Syn. *Cancer*, Linnæus.—*Gammarus*, Fabricius.—*Eulimene*, Latreille et auctorum.—*Artemia*, Leach et auctorum.—*Branchipus*, Latreille, Fischer, &c.—*Artemisus*, Lamarck.—*Artemis*, Thompson.

The body in this genus consists of the same number of segments as in the three preceding, is soft and without covering, but is more slender in shape, and has the caudal segment simply bilobed at the extremity, instead of being armed with two large plumose fins. The inferior antennæ in the male are large, flat-shaped, broad, and divided into two articulations. The basal joint has neither the antenniform appendage of *Branchipus* and *Streptocephalus*, nor the complicated digitiform and fan-shaped apparatus of *Chirocephalus*. They inhabit salt water, frequently even in water which is very highly charged with salt. They swim upon their backs.

The genus *Eulimene* was founded by Latreille in 1817, in Cuv. Règn. An. 1st edit. iii. 68; that of *Artemia* by Leach in 1819, in the Dict. Sc. Nat. xiv. The term *Eulimene*, however, had been previously used by Peron for a genus of *Acalepha*, and though the name *Artemia* is liable to objections from its construction (Artemia for Artemis), I prefer adopting it to burdening the nomenclature with another synonym.

Five species have been described.

1. Artemia salina, Leach. *Antennis inferioribus maris validis,*

compressis, articulo secundo lato apice acuminato, basali unidentato ; segmento caudali setigero ; ovario quadrilaterali.

Long. 6 lin.

Pro Synonymis vide "Baird's British Entomostraca," et adde :—

Eulimene albida, Latreille, Nouv. Dict. d'Hist. Nat. x. 535 ; Cuv. Règn. An. 2nd edit. iv. 178 ; Desmarest, Cons. gen. Crust. 394 ; Risso, Hist. Nat. Eur. Mérid. v. 165 ; Lamarck, Hist. Nat. An. s. Vert. 2nd edit. v. 199 (note) ; M. Edwards, Hist. Nat. Crust. iii. 371 ; White, Catalogue of Crustacea, Brit. Mus.

Artemia Eulimene, Leach, Dict. Sc. Nat. xiv. 543.

Hab. In salinis ad "Lymington," in Anglia ; prope "Montpellier," in Gallia ; in Mediterraneo, prope "Nice," &c.

This species, which seems to have been first observed by M. Schlosser, in the salt-pans at Lymington, is nearly white, slender, and about half an inch in length. The abdomen is long, fully as long as the body, and the caudal segment is simply divided into two small lobes, which give origin to several short setæ. The inferior antennæ in the male are divided into two articulations, the basal one of which has on its inner edge at about half of its length, a short, stout, conical tooth. The terminal joint is broad, bends nearly at a right angle about the middle of its length, and terminates in a sharp point. In the female these organs resemble closely those of the preceding genus. The ovarian bag is large, of a quadrilateral shape, somewhat pointed at the two sides, and opens at both sides to allow the ova to escape.

The genus *Eulimene* was founded by Latreille to receive a small crustacean which was found by M. Cuvier amongst some marine animals which he had received from Nice. The chief character by which he distinguished the genus was the extreme shortness of the abdomen, which he considered terminated almost immediately after the last pair of feet in a swollen, semiglobular lobe filled with a blackish matter, and having springing from it a long thread-like body, of a dark colour also, and which he conjectured might be an oviduct. In the British Museum are many specimens of this little animal, received by Dr. Leach from M. Cuvier, and labelled by Dr. Leach himself, "*Artemia Eulimene*, from Nice, given by M. Cuvier." From a careful examination of this species I consider it specifically identical with the *Cancer salinus* of Linnæus, the *Artemia salina* of Leach. The specimens in the Museum are all females, and upon comparing them with specimens of *Artemia salina* from Lymington, no difference is perceptible, except that the specimens from Nice are rather whiter in colour and have the ovarian bag and abdomen of a darker hue. It is undoubtedly this dark-coloured ovarian bag that was mistaken by Latreille for the termination of the body, and the "long filament like an oviduct" which springs from it, is in reality the abdomen. The difference in colour evidently depends upon the food of the animal, the alimentary canal of the specimens from Nice being filled with a dark-coloured matter, thus giving the abdomen a blackish hue, while those from Lymington have the canal filled with matter of a brownish tint. In the second edition of the 'Règne Animal,'

in his notice of the *Artemia salina*, Latreille says, it is a species, "sur lequel nous n'avons encore que des renseignements très imparfaits." From this it would appear that he had never seen that species, and as most probably the specimens he had received from Cuvier were a little injured from having been preserved in spirits, it is not at all surprising that he did not observe the identity of the two.

2. Artemia Milhausenii, Fischer. *Antennis inferioribus maris gracilibus, articulo secundo angusto; segmentis duobus cephalicis longis, segmento caudali bilobato, non setigero.*

Long. 5 lin.

Branchipus Milhausenii, Fischer, Bull. de la Soc. Imp. Nat. Moscou, vii. 1834.

Artemia Mulhausenii, M. Edwards, Hist. Nat. Crust. iii. 370.

Artemia salina, Rathke, Faun. der Krym. 395. t. 6. f. 14-21.

Hab. In lacu salino "Loak" in Crimea; *M. Milhausen.*

This species, which was found by M. Milhausen in the salt-water lake of Loak in the Crimea, is about 5 lines in length and of a brown colour. The inferior antennæ of the male are much more slender than in the preceding species. The basal joint has no tooth and the terminal joint is cylindrical and pointed. The superior antennæ, according to Fischer, have the first joint very short and of an obconical form, and the two cephalic segments are considerably elongated. The abdomen is slender, shorter than the body, and is terminated by a simple bilobed process not furnished with setæ. The feet are rather long, and the terminal joint is armed with long filaments.

In the month of July these animals abound in great numbers; they fill the lake and give the water a brick-red colour.

3. Artemia Guildingii, Thompson. *Species hæc, reperta in India Occidentali, delineata est a Domino Thompson in 'Zoological Researches,' sed non descripta, necnon satis accurate delineata est.*

Artemis Guildingi, Thompson, Zool. Research. Fasc. v. t. 1. f. 11.

Hab. In insula "St. Vincent's," in India Occidentali; *Rev. L. Guilding.*

This species is figured by Mr. Thompson, but not sufficiently described to enable me to give a good diagnosis of it. It was found at St. Vincent's in the West Indies by the Rev. Lansdowne Guilding, by whom its natural history was intended to have been more fully detailed. The body seems to be thick and the abdomen shorter than the body and stout. The caudal segment does not appear to be lobed nor setigerous. The cephalic segment is conical in shape, and the superior antennæ, according to Mr. Thompson's figure, consist each of four joints. The ovarian sac consists, according to the same authority, of two articulations.

4. Artemia arietina, Fischer. *Antennis inferioribus maris validis, articulo secundo latissimo, basali unidentato; antennis superioribus apice furcatis, setigeris; segmento caudali bilobato, lobis setigeris.*

Long. 4–6 lin.

Artemia arietina, Fischer, Middendorff's Sibirische Reise, ii. 156. t. 7. f. 31–35 (1851).

Hab. In vicinitate urbis Odessæ; *Middendorff.*

This species, which was found by Middendorff in the neighbourhood of the town of Odessa, is about from 4 to 6 lines in length. It approaches very near to the *Artemia salina*. The inferior antennæ in the male have the second joint very broad and flat and sharp-pointed. The superior antennæ are forked at the extremity, the forks unequal, each having two terminal setæ. The eye is very large and the caudal segment is bilobed, each lobe terminating in three pretty long setæ.

5. Artemia Koppeniana, Fischer. *Antennis duabus ut in præcedente; segmento caudali non lobato nec setigero.*

Long. $2\frac{1}{4}$–3 lin.

Artemia Koppeniana, Fischer, Middendorff's Sibirische Reise, ii. 157. t. 7. f. 36–37 (1851).

Hab. In Russia Australi; *Koppen.*

This species was found in Southern Russia by M. Koppen, and is only from $2\frac{1}{4}$ to 3 lines in length. Its principal difference consists in the form of the caudal segment, which is not lobed at the extremity, but is simply squared off and has no setæ springing from it.

Genus Polyartemia, Fischer.

Corpus molle, gracile; segmentum caudale pinnis nullis instructum; pedes branchiales, paribus novemdecim. Antennæ inferiores maris bi-articulatæ, articuli terminales in ramos duos divisi et dentibus numerosis instructi; articuli basales appendicibus tenuibus armati.

Polyartemia, Fischer, Middendorff's Sibirische Reise, ii. 154 (1851).

This genus was founded by Sebastian Fischer to receive a species of the family *Branchipodidæ*, which differs in some respects from any of the genera of the family. It is furnished with appendages to the male inferior antennæ, which are two-jointed, approaching in this respect to the genus *Chirocephalus*—and it is destitute of caudal fins, resembling in this structure the genus *Artemia*—but the number of feet is nineteen pairs, and the male inferior antennæ have each of the terminal joints divided into two broad, flat branches, the one overlying the other like the branches of a pair of scissors. These branches are furnished on their edges with three or four rows of sharp teeth. The basal joint has a rounded process at about half its length armed with short setæ. The appendages attached to these organs are conical in form, thin, and apparently not provided with digitiform or flabelliform appendages. The abdominal portion of the body is shorter in proportion than in any of the other genera, and the ovarian sac of the female is moderately large and lies close upon the abdomen, seeming when viewed from above to be amalgamated with it. The male organ is cylindrical, four-jointed, and is contained in a sheath which is serrated on one side.

Polyartemia forcipata, Fischer, Middendorff's Sibirische Reise, ii. 154. t. 7. f. 24–28.

As this is the only species yet known, the generic characters given above will suffice.

Hab. In fluviis "Trundra, Taimyr et Boganida" in Siberia; et prope "Tri-Ostrowa" in Lapponia; *Middendorff*.

Species hujus familiæ, incertæ sedis aut quæ dubiæ sunt—

Genus Branchipus?

1. *Branchipus ferox*, M. Edwards, Hist. Nat. Crust. iii. 369.

This species, according to M. Milne-Edwards, has neither the antenniform appendage attached to the inferior antennæ of the male of *Branchipus*, nor the complicated apparatus of *Chirocephalus*. They are pointed at the extremity, and thus differ also from these organs in *Streptocephalus*. The description given of this species by M. Edwards is so short, that it is difficult to say to what genus it may belong. His description is as follows:—"Cornes céphaliques sans appendice près du côté interne de leur base, pointues au bout et sans dent sur le bord externe. Abdomen lisse, nageoires caudales longues et étroites. Longueur environ 15 lignes. Habite les eaux douces aux environs d'Odessa."

2. *Cancer paludosus*, Müller, Zool. Dan. ii. 10. t. 48. f. 1–8; Herbst, Krabben, ii. 118. t. 35. f. 3–5.

Most authors have assumed this species to be the same as the *Chirocephalus diaphanus*. As M. Milne-Edwards very properly observes, however, the figure of this species given by Müller shows no appearance of the complicated apparatus belonging to the male antennæ of *Chirocephalus*. There does not appear either to be any antenniform appendage belonging to them, as in the genus *Branchipus*, and the structure of the antennæ themselves removes it also from the genus *Streptocephalus*.

3. Some fragments of a species of Branchipode were brought by Sir John Richardson from Cape Krusenstern in N. America, collected there by Mr. J. Rae in August 1849, along with the *Apus glacialis*. They consist of portions of two males and two females. The male antennæ are two-jointed; the basal joint is thick, and has at its lower part near its junction with the second a row of small teeth; the second joint is cylindrical and pointed. The female horus or antennæ are flat apparently, and have a short hooked spine at the extremity. The caudal fins are rather long and fringed with long cilia. In some respects this species resembles the figure of the *Cancer paludosus* of Müller, but the fragments are too much decayed in the spirits to enable me further to describe it. It does not appear to have either antenniform appendages or any apparatus attached to the antennæ of the male.

Should these three species prove to be distinct, they may form another genus of this family, characterized by the want of these appendages and the toothed or serrated basal joint of the male cephalic horns.

Genus Streptocephalus?

4. A figure of a species of Branchipode was exhibited at a meeting of the Zoological Society by Dr. Nicholson in February 1851. The figure was not sufficiently accurately made to enable the species or genus to be made out. In all probability, however, it may prove to be a species of *Streptocephalus*. It is a native of India and inhabits freshwater ponds.

Genus Artemia?

M. Audouin, in the Ann. de la Soc. Ent. de la France, v. Bull. 61, 1836, mentions a species of *Artemia* closely allied to *Art. salina*, as inhabiting the salt lakes of Egypt. In the Ann. des Sc. Nat. 2nd ser. vi. 230, he again mentions the fact, that numbers of *Artemiæ* have been found in the "lacs de natron" in Egypt; but no further description has ever been given of them.

Family Limnadiadæ.

Genus Limnadia.

Sp. Limnadia antillarum, nov. sp. (Tab. XXIII. fig. 1).

Carapace valves of a rounded oval shape, and of a transparent whitish colour; prominent on dorsal margin where the muscular attachment of the body takes place, sloping from thence rather suddenly towards anterior extremity where it forms a somewhat blunt point, and more gradually to posterior extremity, which, as well as ventral margin, is rounded. Antennules bluntly serrated or crenulated on their upper edge, rather shorter than the peduncles of large antennæ, which are stout and not half the length of the body. They consist of nine articulations, each having one or two long plumose setæ springing from the under edge, and one short stout spine at each joint on the upper edge. Caudal lamellæ of considerable length, and beset on upper edge with long plumose setæ to within a short distance of the tip, which is somewhat curved, sharp-pointed and slightly serrated on upper edge. Feet 18 pairs.

The structure of the carapace is the same as in *Limnadia Hermanni*, the surface being covered with minute dots or punctures.

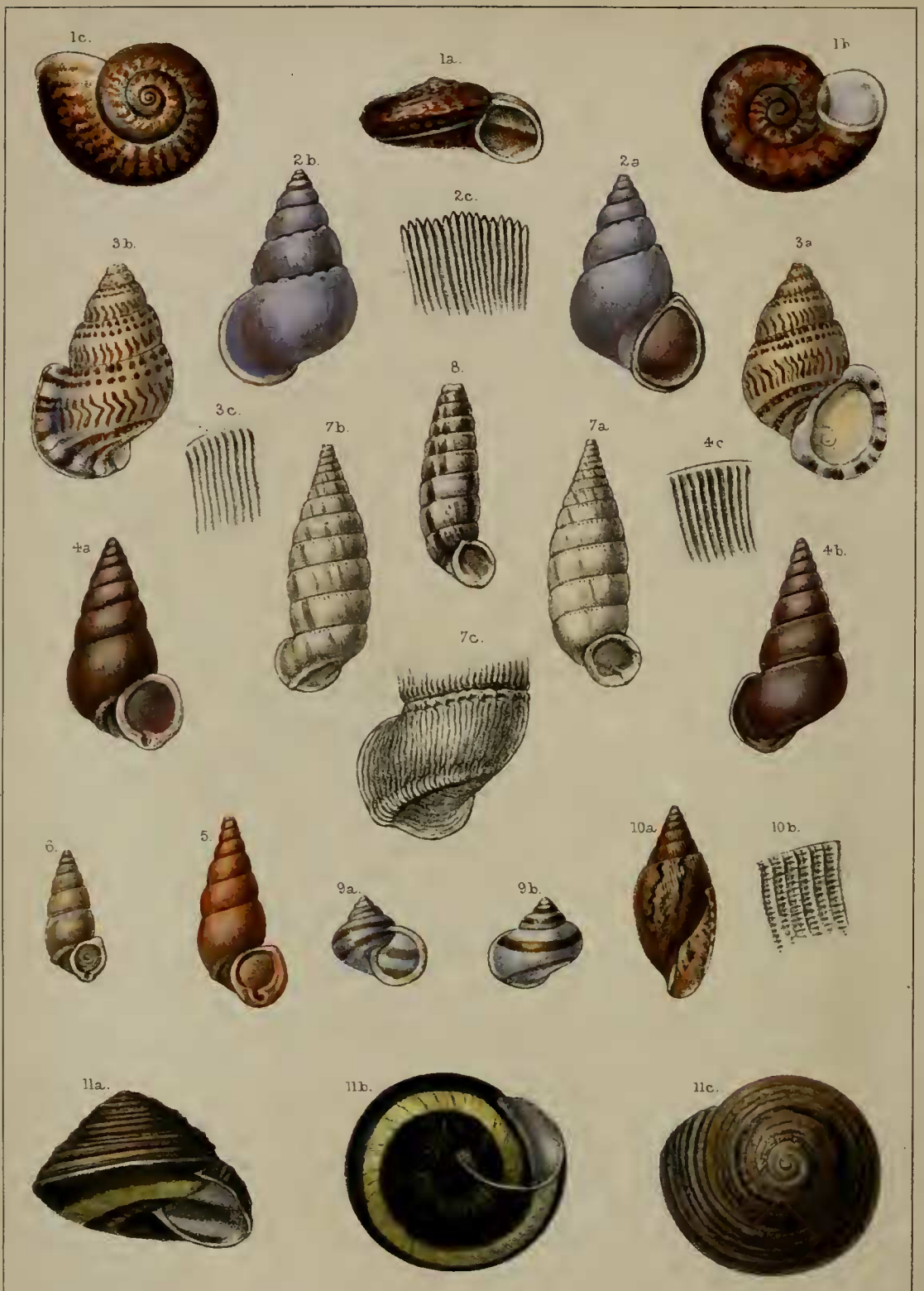
This species differs from the two others in the shape of the carapace and in having the setæ of antennæ and tail plumose.

Hab. St. Domingo, West Indies; *M. Sallé.* Mus. Brit.

Genus Estheria.

Sp. Estheria Dallasii, nov. sp. (Tab. XXIII. fig. 5).

Carapace valves shortly obovate and flat, upper margin from the beaks to two-thirds of its length almost straight; anterior extremity rather broader than posterior. Beaks prominent and situated near anterior extremity. The shell is of a light horny colour and very thin and translucent. Ribs elevated, smooth and numerous, about 20 in number. The intermediate spaces are concave and are covered all over with rough-looking spots of an irregular size and appearance, approaching



W H Baily

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Fig. 1. Cyclostoma Bairdii. Pfr
2. C. nobile. „
3. C. magnificum. Sallé.
4. Cataulus pyramidatus. Pfr.
5. C. eurytrema „
Fig. 6. Cataulus Layardi. Gray.
7. Cylindrella Menkeana. Pfr.
8. C. flammulata. „
9. Cyclostoma bicolor. „
10. Achatina Richardi. „
Fig. 11. Helix Launcestonensis. Reeve.

somewhat in structure to that of *brasiliensis*. It differs from that species however in size and in being of a more rounded oval shape.

Hab. Brazil? I am indebted for this species to Mr. Dallas, who found it in a collection of insects chiefly from Brazil. Mus. Brit.

February 24, 1852.

W. J. Broderip, Esq., F.R.S., V.P., in the Chair.

The following papers were read :—

1. Description of a new species of Helix from Van Diemen's Land. By Lovell Reeve, F.L.S. etc.

(Mollusca, Pl. XIII.)

Helix Launcestonensis. *Hel. testâ umbilicatâ, abbreviato-conoideâ, trochiformi, supernè rugosâ et ferrugineâ, quasi epidermide indutâ, infra lævigatâ, nitente, intensè nigrâ; fasciâ distinctâ luteâ cingulatâ; spirâ obtusâ; anfractibus sex, supernè convexis, medio concavis, carinis lineisque gemmulatis undique cingulatis, peripheriâ acutè carinatâ, basi convexâ; umbilico mediocri, pervio, subprofundo*; *aperturâ obliquè lunari, peristomate tenui, vix reflexo, margine columellari breviter dilatato.*

Hab. Launceston, Van Diemen's Land.

This very characteristic new species of *Helix* has just been received from Van Diemen's Land, where it was collected last summer by Mr. Ronald Gunn in a dense beech forest, north-east of Launceston. It differs materially from any of vast numbers of *Helices* now known to conchologists, especially in the different character of the upper and lower parts of the shell. The upper portion of the whorls has a rough rusty surface encircled by numerous finely beaded lines and keels ; the lower surface is smooth and shining, jet-black, encircled by a distinct yellow band.

2. On the Habits of Strigops habroptilus or Kakapo. By David Lyall, M.D., R.N., Late Surgeon to H.M.S. Acheron.

(Aves, Pl. XLVI.)

Although the *Kakapo* is said to be still found occasionally on some parts of the high mountains in the interior of the north island of New Zealand, the only place where we met with it, during our circumnavigation and exploration of the coasts of the islands in H.M.S. Acheron, was at the S.W. end of the middle island. There, in the deep sounds which intersect that part of the island, it is still found in considerable numbers, inhabiting the dry spurs of hills or flats near the banks of rivers, where the trees are high, and the forest comparatively free from fern or underwood.

The first place where it was obtained was on a hill nearly 4000 feet above the level of the sea. It was also found living in communities on flats near the mouths of rivers close to the sea. In these places its tracks were to be seen resembling footpaths made by man, and leading us at first to imagine that there must be natives in the neighbourhood. The tracks are about a foot wide, regularly pressed down to the edges, which are two or three inches deep amongst the moss, and cross each other usually at right-angles.

The *Kakapo* lives in holes under the roots of trees, and is also occasionally found under shelving rocks. The roots of many New Zealand trees growing partly above ground, holes are common under them; but where the *Kakapo* is found many of the holes appeared to have been enlarged, although no earth was ever found thrown out near them. There were frequently two openings to these holes, and occasionally, though rarely, the trees over them were hollow for some distance up.

The only occasion on which the *Kakapo* was seen to fly was when it got up one of these hollow trees and was driven to an exit higher up. The flight was very short, the wings being scarcely moved; and the bird alighted on a tree at a lower level than the place from whence it had come, but soon got higher up by climbing, using its tail to assist it.

Except when driven from its holes, the *Kakapo* is never seen during the day, and it was only by the assistance of dogs that we were enabled to find it.

Before dogs became common, and when the bird was plentiful in inhabited parts of the islands, the natives were in the habit of catching it at night, using torches to confuse it. It offers a formidable resistance to a dog, and sometimes inflicts severe wounds with its powerful claws and beak. At a very recent period it was common all over the west coast of the Middle Island, but there is now a race of wild dogs said to have overrun all the northern part of this shore, and to have almost extirpated the *Kakapos* wherever they have reached. Their range is said to be at present confined by a river or some such physical obstruction, and it is to be feared that if they once succeed in gaining the stronghold of the *Kakapo* (the S.W. end of the island) the bird may soon become extinct.

During the latter half of February and the first half of March, whilst we were amongst the haunts of these birds, we found young ones in many of the holes, frequently only one, never more than two, in the same hole. In one case where there were two young ones I found also an addled egg. There was usually, but not always, an old bird in the same hole with the young ones.

They build no nest, but simply scrape a slight hollow amongst the dry dust formed of decayed wood. The young were of different ages, some being nearly fully fledged, and others covered only with down. The egg is white and about the size of a pigeon's. (Aves, Pl. XLVI.)

The cry of the Kakapo is a hoarse croak, varied occasionally by a discordant shriek when irritated or hungry. The Maories say that during winter they assemble together in large numbers in caves, and

at the times of meeting, and, again before dispersing to their summer haunts, that the noise they make is perfectly deafening.

A good many young ones were brought on board the ship alive. Most of them died a few days afterwards, probably from want of sufficient care; some died after being kept a month or two, and the legs of others became deformed after they had been a few weeks in captivity. The cause of the deformity was supposed to be the want of proper food, and too close confinement. They were fed chiefly on soaked bread, oatmeal and water, and boiled potatoes. When let loose in a garden they would eat lettuces, cabbages and grass, and would taste almost every green leaf that they came across. One, which I brought within six hundred miles of England (when it was accidentally killed), whilst at Sydney, ate eagerly of the leaves of a *Banksia* and several species of *Eucalyptus*, as well as grass, appearing to prefer them all to its usual diet of bread and water. It was also very fond of nuts and almonds, and during the latter part of the homeward voyage lived almost entirely on Brazilian ground-nuts.

On several occasions the bird took sullen fits, during which it would eat nothing for two or three days at a time, screaming and defending itself with its beak when any one attempted to touch it. It was at all times of an uncertain temper, sometimes biting severely when such a thing was least expected. It appeared to be always in the best humour when first taken out of its box in the morning, hooking on eagerly with its upper mandible to the finger held down to lift it out. As soon as it was placed on the deck it would attack the first object which attracted its attention—sometimes the leg of my trowsers, sometimes a slipper or a boot. Of the latter it was particularly fond: it would nestle down upon it, flapping its wings and showing every symptom of pleasure. It would then get up, rub against it with its sides, and roll upon it on its back, striking out with its feet whilst in this position.

One of these birds, sent on shore by Capt. Stokes to the care of Major Murray of the 65th Regiment at Wellington, was allowed to run about his garden, where it was fond of the society of the children, following them like a dog wherever they went.

Nearly all the adult Kakapos which I skinned were exceedingly fat, having a thick layer of oily fat or blubber on the breast which it was very difficult to separate from the skin. Their stomachs contained a pale green, sometimes almost white, homogeneous mass, without any trace of fibre in it.

There can be little doubt but that their food consists partly of roots (their beaks are usually more or less covered with indurated mud), and partly of the leaves and tender shoots of various plants. At one place where the birds were numerous we observed that the young shoots of a leguminous shrub growing by the banks of a river were all nipped off, and this was said by our pilot, who had frequented these places for many years in a whaling vessel, to be the work of the Kakapo.

Their flesh is white, and is generally esteemed good eating.